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TELEVISION, RADIO AND FILMS--A SURVEY.

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THE AUTHOR BEMOANS THE LACK OF RIGOROUS RESEARCH IN EDUCATIONAL MEDIA, ATTRIBUTING IT TO POOR RESEARCH STANDARDS. HE IS CHEERED, HOWEVER, BY THE RECOGNITION OF RESEARCH AS A NEED. TV, RADIO, AND FILMS ARE EACH TREATED SEPARATELY, REFERRING TO HISTORICAL AND TECHNICAL MATTERS, AND THEN TOGETHER WITH REFERENCE TO COMMON PROBLEMS. THE AUTHOR URGES THAT THE IMPLICATIONS OF FINDINGS OF "NO SIGNIFICANT DIFFERENCES" BETWEEN CONVENTIONAL AND TV INSTRUCTION BE FURTHER INVESTIGATED TO DETERMINE PRACTICAL ACTION THAT COULD BE TAKEN. HE ALSO DISCUSSES--TEACHER ROLES AND ATTITUDES, INTEREST AND ATTITUDES AS LEARNING FACTORS, PRODUCTION TECHNIQUES, TIME FACTORS AND VISUAL ASPECTS OF PRESENTATION OF MATERIAL, MOTIVATION, FEEDBACK, AND USE OF COLOR. HE LISTS 4 PROBLEMS--MISUSE OR MISINTERPRETATION OF RESULTS, INADEQUATE TESTING, THE ANTI-EDUCATIONAL EFFECTS OF MUCH COMMERCIAL FARE, AND THE NEED FOR TRAINING IN TV AND PICTORIAL PERCEPTION AND DISCRIMINATION. HE CONCLUDES THAT A TRULY NATIONAL EDUCATION RESEARCH CENTER AND PROGRAM ARE VITAL. A SYSTEMS APPROACH IS NEEDED. HE ADDS THAT TOO MUCH RESEARCH HAS BEEN OF TOO LITTLE SOCIAL SIGNIFICANCE. FINALLY, HE CALLS FOR FINANCIAL SUPPORT FROM LARGE CORPORATIONS WHOSE PROFITS COME FROM COMMUNICATION AND EDUCATION ACTIVITIES. ONE-HUNDRED SEVENTY-EIGHT REFERENCES ARE LISTED. (LH)

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A SURVEY

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TELEVISION, RADIO AND FILMS: A SURVEY

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In late 1964 Dr. Steven Muller, Director of the Cornell Center for International Studies, told the Convention of the New York State Association of Secondary School Administrators: "The colleges are in ferment. In fact, the American university is at this moment in as revolutionary a state as it has ever been, at least since the founding of the great land-grant colleges a century ago." Elementary and secondary education are in equal revolution.

The drop-out rate is frightening. Its consequences, in the lives of these students, in unemployment figures, in delinquency, in mental health problems and in a dozen other areas will be awesome in another ten years if not before.

The fruits of the electronic age we have entered are not yet fully apparent. The new languages of television, radio and films have had consequences that the nation blames the schools for, as a convenient whipping-boy, as it blames them for physical unfitness. Johnny can't read, or write--not only in the United States, but in nation after nation. In France and most of the Western world, as the electronic media become dominant, the schools are fighting a desperate rear-guard action to preserve the curricula, traditions, standards, designs and solutions to problems that were developed in, and appropriate to, an age based on print, on literate concepts, on the written word. But this age, this sense of security for educators, these standards, are gone forever. Today most of the communication we receive--and especially our children who do not have our anchorage in a print age when being educated was referred to as being "well-read"--is effected by moving shapes, colors,

tones, rhythms, and the bombardment of evanescent media that hit and run and are gone, too fleeting to stop in flight and analyze or challenge.

Into this breach we are called upon to hurl the "technology of education". Pared to essentials, this phrase includes mechanical, electric, electronic and other devices and procedures: films, television, radio, language laboratories, team-teaching, teaching machines, programmed learning and the other instruments of our age. What is too little forgotten is that these tools of themselves no more guarantee better education than many varieties of the finest oil paints, water colors and other art media guarantee great art.

As a nation we have been prone to wait until problems become crises before we do anything about them. Sputnik helped. With the passage in 1958 of the National Defense Education Act we had, for the first time, Congressional and Executive recognition of the importance of these new media, and the necessity to bend them to educational--not merely commercial and entertainment--uses, if we are to survive as a great nation. That this Act was labelled a Defense Act is of considerable significance. Yet a comparison of budgeting for this kind of defense with the military kind reveals how far we have yet to go before our actions match our words, as a nation. But at least a modest break-through was launched to adapt our previously print-based educational system to the modern age.

Already nearly two years ago, at a conference at Brandeis University, C. R. Carpenter, of Penn State, declared: "More research and development work on the applied level has been done on educational television than on any other single innovation or development in American education". When to activity in educational television we add those in films and radio--the areas I'm asked

to cover--to say nothing of programmed learning, the proliferation of new developments is almost beyong imagination. As I survey much of this activity, I must tell you in all candor that I am often as frightened as I am overwhelmed. Many patterns are becoming practices on the basis of the most dangerous hit-and-miss efforts and "hunch" bases. That so many wrong things (a personal opinion) are being done, in such desperately dangerous times, disturbs me. I am not authorized to speak for others who, like me, survey the huge accumulation of findings. (When I recently distributed my personal collection of research reports of the last few years to various departmental branches of the University Of Illinois Library, the stack measured over seventeen feet of printed and mimeographed reports.) But while I hesitate to use the phrase "vast wasteland" to describe the general level--thank heaven there are many exceptions--I must tell you that I feel a great discouragement in general at what we have accomplished.

Before getting answers, we need to ask the right questions. I don't think, on balance, that we have done this. So many perfectly right answers don't interest me in the least, because so many of the questions were irrelevant to our problems. In many cases reports reveal better ways of doing things we should no longer be doing at all. Many of the so-called research reports are products of workers with no research training or standards. They do not stand up under any valid research criteria. My principal consolation, in spite of the many wasted and mis-directed efforts so far, is that we have started: that research, by name, has begun to be recognized as a need. Perhaps, by now, we have begun to realize that no quick, easy or conclusive findings have emerged, or will emerge, from any few experiments, however well-funded they may be. Solutions will come only from long, slow, careful, specific

well-controlled research and experimentation. And I think we should now enter that era, putting behind us impatience or belief in the value of amateur solutions intended to save money or make education quick and easy.

If I may sound a very personal note: I wish I were more certain that I am the right person to provide the overview which this paper and this presentation are expected to provide. I wonder if I am not too close to the woods to see the important trees.

Ten years ago this spring, I was Executive Director of the National Association of Educational Broadcasters, housed in a tiny office in Gregory Hall, on the University of Illinois campus. Already then, experimentation was mounting, and reports were coming in too fast to cope with. Dr. Wilbur Schramm, then Dean of Communications at Illinois, suggested to me that the NAEB might perform a useful service by summarizing research and teaching reports, and publishing them. Thus was born the NAEB Factsheet service, summarizing significant research. Dean Schramm, whose unending energy never ceases to amaze me, did the first digests personally. The NAEB Factsheets, now running to well over three hundred, are still being published, and provide a useful record for interested individuals. Research Seminars were later conducted by the NAEB and reports of their proceedings are still available and useful.

Across the hall were a dozen or so young researchers in training. One of them, Hideya Kumata, had completed his Ph.D., and was also impressed with the mounting volume of research and experimentation. Thus and there was born his Inventory of Instructional Television Research, published the following year, in 1956. It was the first of many such summaries and digests to appear later.

Then came many conferences, several of them spear-headed by the Department of Audiovisual Instruction of the National Education Association. Its fine Audiovisual Communication Review (now AV Review),) contains hundreds of the most

important studies and projects of the last ten years, as well as abstracts of hundreds of new media research and experimentation reports.

In 1958, many of us helped find staff and develop policies for the newly-born National Defense Education Act. There were several titles, as you know, covering experimentation and research into Language, Mathematics, Science and other specific disciplines, as well as a Cooperative Research Program. Title VII of this Act dealt specifically with the new media. Of the perhaps ten thousand applications which came in for funding, many were read and rejected. By the time I left the Advisory Committee for this program a few months ago, Part A had supported over one thousand grants and Part B had contracted for some two hundred projects, not all, of course, in films, television or radio. Many were in the programmed learning field.

Prior to the enactment of the National Defense Education Act, the Ford Foundation, through the Fund for the Advancement of Education, had a national program going in hundreds of schools across the nation. These too, needed to be followed and studied. The list alone of institutions supported in the Fund's efforts runs to several pages. The 1961 summary of the Fund's report mentioned 800 schools in its many projects.

Meanwhile, training programs of the Navy, Air Force and Army were proliferating, with significant results, based on competent research by qualified researchers. And many independent studies were reminding us that not the only, or the best, studies were going on under all these umbrellas.

As Chairman of the Mass Communications Committee of the U.S. National Commission for UNESCO, I found that some of the most significant developments were taking place abroad. Japan's nation-wide system of educational television

is many years ahead of us. Italy's Telescuela program for illiterates and remote area students is one the U.S. can envy. Russia's development of language laboratories from 1954 on set standards and levels we are still far behind. And the volumes of proceedings from international conferences held around the world, and reports of studies in some forty countries, continue to come in. I truly have felt too close to the woods to provide the perspective which I know is needed for this conference.

Some compromise obviously had to be found. The one I have adopted is to limit myself drastically in the number of specifics which can be covered in this paper. How much you profit from what I have been able to do will depend very heavily on the home work you are willing and able to do after you leave here. From my personal point of view the selective bibliography I've compiled at the end may well be more useful and significant than what I have to say here. I urge you to follow up as much as possible in using it, for much of the knowledge of research in these media is to be found listed there. How else can you be exposed to the findings and guidance of capable scholars and researchers like Allen, Becker, Belson (of England), Bronson, Carpenter, Cassirer, Dale, Deutschmann, Edling, Evans, Fairbanks, Finn, Furu (of Japan), Gerbner, Glaser, Greenhill, Gropper, Hartman, Hayman, Hoban, Holmes, Hovland, Kanner, Lasswell, Lumsdaine, Maccoby, McLuhan, May, Meierhenry, Miller, Oxhandler, Popham, Postman, Schramm, Siegel, Skinner, Smith, Stickell, Tannenbaum, Twyford, Vander Meer, Vernon, Vesselo (Europe), and Westley--to mention only a few of the senior leaders in this field? For the several hundred not mentioned in this bibliography I offer my apologies. This bibliography resembles no other, representing as it does the most agonizing appraisal and drastic

elimination in order to keep only what I found most directly useful.

For the admirable digests they provide of what they consider the most significant studies in recent years I would underline the value of summaries and evaluations of Barrow and Westley, Lumsdaine (in Gage), MacLennan and Reid, and Schramm, as well as Audio Visual Communication Review, the NAEB Factsheets, summaries available from the U.S. Office of Education for NDEA projects, and the Ford Foundation for the Fund for the Advancement of Education. In many sections of this paper, it will be noted, no single authority is listed, because so many experiments have been replicated, and it is often difficult to know which is the original one. To individuals thereby deprived of recognition, I offer most sincere regrets.

Some of the most significant reports, of course, are modest, unfunded ones, never published. For example it is my opinion that the new program in the teaching of biological sciences, at Purdue, to be referred to later, and other similar ones being quietly carried out from regularly budgeted local funds, are of great importance for their imagination, originality and modesty.

In view of the enormous volume of data, and the scores of categories used by different scholars and summarizers, only a few of the principal problem areas are attempted here: a few salient trends, and directions which appear to me basic. These plus the bibliography are the most I can provide from the mass of data available.

Although films, radio and television are separately discussed very briefly, later analytical sections take them up together. One reason is that it is often difficult to decide whether certain studies using various media are television or film, for example. Also, one of the most significant emergent trends is

for the use of more than one medium in which the lines between the separate media merge into areas of common uses and problems. Finally, the brief introductory discussion of each of the separate media is restricted largely to historical and technical matters since functionally they are later discussed together in terms of principally common problems. So saying. . .

Films: a few observations

First a disclaimer: one of the reasons I am humble about my role in presuming to cover the area assigned to me is that I do not presume to be an authority on film uses for education. I therefore invite supplementation to this section by others in session assembled and in other papers which may be prepared.

Lumsdaine in his "Instruments and Media of Instruction",has admirably traced the history of the instructional film. The predominantly psychological emphases which prevailed from 1918 to 1930; the Payne studies in the 1930's; World War II emphases on propaganda uses; Hoban and Van Ormer's excellent study of 1950 and May and Lumsdaine's of 1958; and the excellent projects of the office of Naval Research, the Navy's Special Devices Center and the Air Force, represent benchmarks in shaping and tracing the development of film uses for education. In these uses the names of Hovland, Lumsdaine, Sheffield, Hoban, Kanner, and the Payne Fund provide useful leads for further inquiry. Film research, then, covers a period of nearly fifty years, as compared to the shorter span for radio and television. The Wilson film catalog of 1958 listed over 10,000 teaching films. The extensive literature of film research has great relevancy for television. The writer, Schramm, and others have suggested the need for such a study, but up to the present no adequate work along this line has appeared, to my knowledge.

The comparative advantages of silent and sound film, of moving pictures versus slides, of sound film in the classroom, on television and in conjunction with graphics, still seem subject to considerable further development, especially newer approaches to 16-millimeter films, to which present attention is given, and the very promising newly-developed 8 millimeter films, with cartridge loading. The problem of teacher difficulties with projectors in the classroom has greatly reduced more effective film uses in schools in the past. Both TV and the new 8 mm developments remove many of these objections.

The long tradition of film uses, both in production and utilization, has been greatly modified in recent years in order to make possible their joint uses with other tools, including teaching machines, many uses of which involve flexible start-stop characteristics, and emphasis on shorter segments, rather than on longer films which seek to do an entire teaching job by themselves. Like radio, film has found itself increasingly in the role of an aid, rather than a primary instrument or medium.

In addition to the new uses of film itself, as mentioned above, the recently-developed rear view projector has greatly facilitated integrated uses. Such projectors are convenient; they are in one piece and don't require a separate screen. Being simpler to operate, they lend themselves to use by a teacher in the front of the room who can stop and start them as desired to allow for discussion as needed, without involving impatient operators and the other problems of old-style projectors, which most of us recall. The room need not be darkened for their use, so reloading, note-taking and discussion are more easily possible. Finally, the entertainment "set", in which, when the room is darkened and a film is shown, students tend to "horse around", lean back expecting to be entertained, as at the movies, or even go to sleep, is eliminated as an

obstacle to learning which has offered serious problems in the past.

Although most film use research will be taken up later, in connection with common new media problems, two additional observations should be made here. First, Renshaw, Miller, and Marquis in Payne Fund studies on the effect of viewing movies on students' sleep and rest, revealed some disturbing findings on learning-readiness and alertness of children in the classroom. These effects are noted also by Schramm, thirty years later, in connection with out-of-school viewing of television. As noted earlier, films in general, thus viewed, created in children habits of relaxation and the expectation of pleasure, rather than learning, from films, which provided obstacles later to solid learning uses of films in classroom situations. They also often left children sleepy; and teachers suffered as "performers" in comparison with celebrities viewed in films and on TV.

Secondly, the individuals involved in audio-visual activities of the schools in the early days had to be technically enough trained to cope with projector problems: threading, splicing, and so on. There was therefore more gadget or technical orientation on the part of such early personnel than appears later to be true in either radio or television, where dominant personnel were more program-oriented. Consequently more of the interesting technical developments in the media field recently have come from film ranks than from radio or television workers. However, so far, technical research is still one of the types most badly neglected and needed in the new media. Even today most TV receivers and other equipment in the schools have simply been commercial models, designed for homes and entertainment uses. The needs of education are quite different. Far more research is needed into the functional desiderata of equipment and systems for schools. Many such studies need to be combination ones.

Karl Smith, in his study of "Audio-visumatic Teaching" suggests the possibilities of (frequently film-based) magnetic tape recorders with built-in electronic controls to make possible coordinated classroom uses of slide and film strip projectors, for example, in a classroom audio-visual systems approach which a variety of technical developments now makes possible. Further non-mass film applications are needed before film uses, as such, find their proper role in the media "mix" and many of the problems involved are technical.

Radio: A Brief Look

The most spectacular recent bread-throughs in educational radio uses have come not in production or reception, but in the development of state-wide systems, such as that pioneered by the Albany Medical College (See Fredette) and the developing national experiment by the NAEB, under contract with the Office of Education to develop a nation-wide interconnected conference, materials and talent exchange between the institutions of higher education of the nation by radio. From Albany 15 to 20 minute lectures on the newest developments in medicine and surgery are followed by two-way question and answer and discussion sessions in which doctors, assembled at remote hospitals of the state, participate. In one of the early stages of this experiment seventy-six ham operators made their sets available for the talkback, question and discussion portion of the sessions. North Carolina (Hilliard) has since begun the development of a similar system, revealing vastly more versatile and socially useful uses of radio than advertising--based broadcasting has ever developed. The tremendous two-way radio potentials alone for post-graduate as well as undergraduate education are invigorating. However, this is only a first step. The next logical

one, since most educational stations are FM, would and should be application of the orphaned electronic child, facsimile, riding the FM waves on multiplex and providing instantaneous distribution of visual and printed study materials which can then be used on local ETV or by balop and new projection methods, in the classrooms individually. Combined with the now-possible ETV fixed services(Bronson) at the upper 2,000 megacycle frequencies (essentially narrow-band, point-to-point TV) the discipline-by-discipline possibilities this offers for dentistry, medicine, science, art and other fields are difficult to exaggerate. Perhaps the most significant opportunities available to education in both radio and television, in fact, are those available under the FCC's Subsidiary Communications Authorizations (SCA). These are non-mass uses, and education's needs are principally non-mass.

Low-power FM has now developed far enough to find its counterpart in TV (See Holtshouser). In planning efficient, versatile and economical uses of integrated radio-TV-film resources, I must emphasize, education must follow and participate in technical developments. Even lasers, masers and satellites require educational attention, or education will find itself deprived of them, while commerce uses them to sell more soap and cigarettes.

I realize that individual schools have neither the personnel nor the time to keep abreast of technical developments. Participation is possible however, through organizations like the NAEB, the Joint Committee on Educational Broadcasting and other groups, Individual and professional associations generally would do well to assign individuals or committees to keep a watch on these developments. Only by so doing were organized astronomers able to secure specific reservation of certain UHF frequencies for radio-astronomy use.

But such reservations come only to those who ask, and educational specialists must know what they need, before asking, for such requests must be very specific. What is needed, I think, is not simply a "national ETV Network", which I hear mentioned so often, but an integrated national electronic "systems" network which facilitates coordinated use of all new media.

As for unique radio-only success stories, there are many. One of the greatest is that of the Radiophonic Schools of Sutatenza, Colombia, South America (Ozaeta). With a program triggered by and focussed on radio, reforestation (over two million trees) has been carried out; twenty thousand aqueducts, bridges and highways have been built; fifteen thousand rural workers have been trained to vaccinate cattle and other domestic animals; basketball courts and sports programs have been developed throughout the nation in a vast program of sports fitness and active recreation; the prisons of the nation have intensive reading, retraining and other educational programs; and twenty-five thousand sub-standard housing units have been remodeled and improved.

By radio the BBC has taught the world English, with intensive programs since 1939 for over sixty countries, until English is virtually the world's "standard" language. In the Soviet Union a standard common language, co-existing with over a hundred dialects, is gradually developing via radio, more recently keyed to language laboratory programs which involve not only tapes and films, but also listening to and transcribing <u>live</u> radio broadcasts in the languages studied. Many children can understand English before they can read, in many parts of Russia, China, Japan and India.

In the United States the Wisconsin School of the Air, and other school programs, have again begun to use radio, after trying television, for art, music appreciation, language instruction, humanities and the social sciences.

Such devices as speech compression, which make possible communication of the spoken word at rates up to three times the speaker's delivery rate have resulted in better rather than poorer comprehension (Fairbanks).

Radio and audio recordings are indeed coming back into their own in many ways. History programs without archives of the spoken words of Hitler, Churchill, Roosevelt, and Kennedy are missing an important dimension. Though Westley and Barrow found that students in numerous classes learned more by TV, they found, in post-tests, that the retention of radio students tested six weeks later was as high as that of television viewers. Husbands in many televised adult education and human relations programs had as high test results from sound-only tape recordings of these series as their wives who saw the televised versions during the day while the husbands were at work.

There was little research before 1961 into the unique roles which tape recordings and radio can perform not only more cheaply but more effectively, many times, than any other medium. With language labs some impetus has been given in this area. Far more is needed if this flexible, economical medium is to find its proper role in education's arsenal, usually in combination with other tools and methods, rather than alone.

Television: Big Sister

Television came late. But it came with a greater attracting power than any previous medium or combination of media. According to Dr. Frank Stanton, CBS alone is now the world's largest advertising medium. When network presidents a few years ago were begging for less regulation, because TV was an infant industry, delicate and easy to destroy, a newspaper-magazine publisher was heard to mutter: "Some kid!"

The struggle of education for access to radio and television frequencies was a rocky one. Efforts to secure allocations for standard (AM)radio already in 1927 and 1928, under the Federal Radio Commission, were frustrated by determined broadcast industry opposition, led by the two original networks, which were just then getting into operation. Efforts to secure educational frequencies under the newly-created Federal Communications Commission in 1934 were equally successfully contained. The Wagner-Hatfield Bill (See R. Franklin Smith) was defeated following determined pressure by the networks, the trade association, and several other industry leaders. The President of CBS appealed to the FCC not to divide the mass medium of radio for special allocations and special services, and assured the FCC that education would be well taken care of by commercial broadcasters. The new FCC concluded there was no need for education to have its own stations. To this day, as yo· know, education has no reservations in the standard AM band, although the NAEB and other groups are still seeking to end this discrimination through proposals to break down reservations for some fifty clear channel stations which would make several hundred AM educational stations possible. Education does have reservations in FM; and in 1952, in spite of the opposition, again, of the networks, the trade association, and much of the trade press, with determined resistance on a city-by-city basis, education secured some two hundred forty channels on a reserved basis. The history of this struggle, and of commercial opposition, going so far as a court fight in Illinois to keep the University from having its own station, is well documented by Powell.

When allocations were finally made, they were on a year-to-year basis, with repeated warnings from the FCC to use them at once or lose them. Exhausted, discouraged, unable to secure appropriated funds rapidly enough to activate

stations quickly, the educational pioneers who believed in ETV were many times close to exhaustion, and the dream of educational television was close to extinction. It was at this time that the principal educational associations rallied, with the NAEB and through the Joint Committee of Educational Television, to secure funds. It is to the great credit of the Fund for Adult Education, created by the Ford Foundation, though now no longer extant, that educational television was born, and now survives. Ford also has heavily supported educational television programming, as the W. K. Kellogg Foundation had earlier done with its grants to the NAEB which enable this organization to set up a staff and create a radio network for education, via tape recordings in the early fifties.

Today things look better. Besides several hundred closed-circuit installations, there are now some one hundred educational broadcast stations on the air, with another hundred on the way. They serve a hundred million adults and twenty million school, college, and university students. Over fifty thousand credit courses now are offered via closed and open circuit television. In some underdeveloped areas, like American Samoa (Bronson) television is the foundation and basis of entire new educational systems, by-passing centuries of the slow evolution of tradional, print-based systems which then must be changed anyway to accommodate the modern media.

Here I would like to illustrate what poor educators can do to change the course of history, though it transcends research. Some seven years ago a band of us were assembled in a hotel bedroom following NAEB Convention sessions and a board meeting. We were desperate. We were still in danger of extinction. We remembered how educational AM radio stations had been decimated in the 1930's,

dropping from over 200 to less than 30. Someone, perhaps under the influence of exhaustion or other pressures, wondered out loud if "federal aid to educational television" might be a possibility. The political climate, you may recall, was hardly conducive to this approach this many years ago. After the laughter subsided, we kicked the idea around. Notes were taken. Later our legal counsel, at that time Leonard Marks of Cohn and Marks, discussed possibilities with the administrative assistant of Senator Warren Magnuson. A few months later the Magnuson-Roberts Bill was introduced and promptly passed in the Senate. It was held up for two years in the House Rules committee, while we pressed for its passage. When Public Law 87-447 passed, however, a last giant stride and impetus was given. Thirty-two million dollars were appropriated to assist states, on a matching basis, to develop educational television facilities. The bull session had paid off.

Now, in the last few years, educational television has grown from an unknown instrument to a major medium of instruction in U.S. education. Quantitatively it is a success. Qualitatively we still have far to go.

Fortunately ETV was so big and so powerful that it revealed the need for research as no other medium could do. The schools had been needing to do intensive learning theory and teaching research all along. TV involved so many media (films, tape, graphics) and persons (administration, teachers, producers, writers) that a new type of <u>cooperative</u> activity in planning and presentation was literally forced if the entire movement was to be a boon instead of a bane. TV is not one medium but a combination of media. The question: which of the media is, or are, most effective in teaching what, found in television a giant which <u>forced</u> some solid re-evaluations. Improved

education will follow educational television only if and where there are all-out efforts which involve the re-organization and re-definition of staff needs, the design of wholly new types of facilities, the revision and overdue restructuring of curricula which now become possible, and a score of other excruciating wrenches in educational thinking. If TV is seen as merely a new transportation facility to permit the better distribution of outmoded materials, it will make only for cheaper education. What is needed is better education. With TV, which erases geographical boundaries, whole new concepts are possible.

In its cooperative ETV project the Southern Regional Education Board has found that faculties of different institutions will willingly use the offerings of other institutions, if they can be involved in the planning. This factor--cooperative planning and involvement--is more important than geographical proximity of states or institutions.

But the first "reports" and studies of ETV's successes were pathetic. They did show how TV could fill in shortages: of teachers, classrooms, and subjects taught. But usually they merely distributed existing lectures, preserved the boundaries between departments and thereby froze the very progress which ETV invited.

Schramm has noted that ETV has many weaknesses. Oversimplied: it permits no questions, no discussion, no drill, no use of individual differences, and usually promotes passive learning rather than seeking, in all too many of its uses. It also has many strengths: it can magnify and show an entire class at once what's under the microscope. It can handle all other media: films, graphics, slides, records. It can force concentrated attention, share the best teachers, provide a new timeliness of materials and speakers, and provide a

welcome relief and change of pace from usual classroom routines.

More and more reports began to filter in. TV proved to be a great equalizer for unequal school systems. The small school can offer new subjects. Pasewark found TV-taught groups doing significantly better than non-TV groups in typing. North Carolina found "TV instruction, on balance, more effective than conventional (face-to-face) instruction". 1 Oregon (Starlin) reported students learning as well by TV as those taught face-to-face. Houston found TV could remove the pressure for new classroom buildings which the University could not afford.

The Hagerstown experiment reported that in no subject did TV fail to produce results at least as good as those achieved when classroom instruction alone is used. If you ask Hagerstown students today how they like TV-geared teaching as compared to conventional teaching, they will say: "But we've always had TV." Instructional TV is finding its integral place. But that place is not to save money, or replace teachers, or to save space. As the Hagerstown report itself declares (p. 79) "County officials would want to continue using television even if by some stroke of magic it had all the good teachers, classroom space and instructional materials that could be desired".

But this success is traceable to good uses of television. Some schools have tried and abandoned it. They were not ready. The ground must be prepared. Teachers must be trained and re-trained. Careful research must be carried out. To quote once more from the Hagerstown report (p. 37) "There is no magic in television. It is simply a mechanical device, a one-way channel of communication which has many advantages and certain shortcomings. It can be used well or poorly." And one thing that emerges from study after study, as noted especially in the Denver-Stanford Study (Hayman) is this: Don't try to use

TV alone. "It is much more potent when reinforced with other elements of the total teaching--learning context." It is not TV or. TV is no panacea.

With, but not simply by, we can teach faster. 1 Students can learn more. Students will remember more, months later, in many cases. It can teach driver-training and motor-skills and it can change attitudes, as Evans reports. Gordon found that the TV teaching of a trained speech correctionist produced significantly more improvement in articulation than face-to-face teaching by the regular (available) classroom teacher.

The validity and generalizability of such findings will later be challenged: there are too many variables to generalize from such findings. Are some of these differences due to differences in teachers rather than the use of different tools? Or if the same teacher is used for both conventional and TV teaching, does this mean that TV is better, or that the TV teacher tries harder and teaches better, in which case she might, with proper conditions and motivation, teach better in the classroom too? Chicago Junior College (Erickson and Chausow) found there were often greater differences within TV groups than between TV and non-TV groups, some traceable to the use of different teachers and others traceable to different class composition. We must bore deeper into the many factors involved than we have so far done. Let us now look at some of these factors and problems as they relate to all these media.

The Significance of "No Significant Difference"

There is no further need to prove that TV (or films, or radio) can teach as well as conventional methods--or better--or more poorly--depending on the

TV (for example) teacher or presentation, the teacher in the classroom (where there is one), the kind and motivation of students, the quality of the utilization or whatever follows, and the nature and adequacy of the tests used to do the measuring.

In 1962, surveying approximately four hundred cases comparing TV with conventional methods, Schramm found no significant difference in 65 per cent of the cases. If there is so often no significant difference--and this is the principal finding in over a thousand studies--what criteria shall be used to decide whether or not to use TV, and if so in what "mix"? Actually this phrase, "no significant difference" conceals more than it reveals. If there is no significant difference between how well one teacher teaches thousands, and how well similar students are taught in conventional classrooms, this is most significant if teachers are in short supply. If material learned in a half-hour by TV tests as high as that taught in fifty minutes by non-TV, we've saved a great deal of time for other things a school might do. If there is no significant difference between the learning of students at home from TV lectures as compared to those in the hall, this has space and building implications for universities and colleges. If TV, in case after case, saves instructor and student time and results in at least equally good learning from laboratory or other demonstrations, how can we justify <u>not</u> using it?

I would urge you never to be satisfied with "no significant difference" as an answer to a question of relative effectiveness. And I would urge researchers to come up with the <u>other</u> differences and implications, and to test them beyond this point. "No significant difference" is not a stopping point. It is a starting point from which to begin to find what the <u>real</u> differences and implications are.

Teacher Roles and Attitudes

The first teachers were individual tutors, like Socrates. The pressures of progress "organized" them into schools. Print media brought increased standardization. All teachers, within limits, taught the same courses from the same books. Authors were apparently teaching via teachers who often only explicated the course "content." With the arrival of TV, many teachers, and teachers' groups, resisted further demotion and standardization.

This problem has been considerably alleviated by the teacher-team approach: involvement of the classroom teacher in the planning process, in evaluations, and in rotation, when possible, of different good teachers before the camera. But the teacher's role is now changed by the new media. She is no longer as much the source of information, the fountain of wisdom. The role is more like that of mid-wife , guiding to sources, supervising learning rather than providing the instruction. However, encouragingly, most good teachers in an age of "new math", and new language approaches, welcome this new role and find it equally exciting. If they are good teachers, they are respected even if they don't know everything. Their job is to facilitate the learning not to provide all the ammunition as well. In study after study, good projects prove that this problem can be solved.

In project after project, too, the well-trained teacher, motivated and enthusiastic, has proved to be the most effective learning aid available, transcending and over-riding media differences. Vernon found that students in the classes with better teachers learned more even when the teacher did nothing during the presentation. The creation of the environment and motivation to learn

is a factor which reminds us that the quality of the teacher is still important. Davies, Gross and Short found the students of Teacher A preferring a lecture without either visual aids or TV; the students of Teacher B preferred TV; the students of Teacher C preferred the visual aids-aided lecture without TV.

One of the greatest weaknesses in research so far is that these differences between teachers in the compared groups are not taken into account. The need for closer control factors than have been so far applied is apparent if such research is to mean anything. And the need to win teacher support for the new media, by training and patient understanding, is likewise apparent. A negative or resentful teacher can sabotage the uses of any media. Studies under such conditions will yield low results related in no way to the medium used. The need for the introduction of the new media into the basic training of teachers, and in practice-teaching in which TV especially can provide useful observation channels, first for trainees to watch experienced teachers and later for critic teachers for the supervision of trainees, is one useful approach towards making TV and the other new media seem natural parts of the educational and teaching process.

One caution is in order in such uses, however: Teachers must be warned and trained against too slavish imitation of master teachers. Otherwise this art will become only a craft, or a skill. How then will more original teaching be promoted?

Interest and Attitudes as Factors in Learning

Even in earlier references I have used interest as a factor in determining teacher or media effectiveness, and interest is important. So are pleasure and "liking". However, some of the earliest film research revealed that

learning and liking depend on very different qualities of a film. At Illinois we found that students of Professor Janes, in economics, liked the TV presentations better than the face-to-face ones, and rated them as more appealing. But the face-to-face students in this case made slightly higher grades. In many cases teachers on TV who were rated most enjoyable and interesting produced less learning under comparable conditions, in captive situations than teachers rated less pleasant or less liked. Vernon, Vander Meer, Tannenbaum, Brandon, Jorgenson and others found that programs or teachers rated most pleasant did not always or even generally, produce higher learning scores. Various tests seeking to equate learning with student attitudes toward the medium used, employing Osgood's Semantic Differential scale, and Thurstone or Guttmann attitude rating scales, revealed little relationship between attitude and learning. The same prevailed generally for teachers, although in some cases, where students flatly disliked the teacher, enough resistance was present to reduce learning. In various studies of eye contact, for both TV and film, students far preferred the teacher who seemed to be speaking directly to them, but except when lack of eye contact was accompanied by other distractions or inability to understand, eye-contact did not result in higher learning. The same is noted, as mentioned earlier, in the use of feedback buttons and opportunity for questions. Students preferred this method but learned no more. More refined research in this area is obviously needed.

Some clues in this problem were obvious already in radio series we prepared for the Indiana School of the Sky at Indiana University. Students preferred the dramatic, documentary presentations,supported by effective recorded music re-enforcement and bridges, but frequently did better on tests of material learned from simple talk formats. The danger of being distracted from learning by enjoyment, or losing oneself in the rhythm of the program or lesson, is a real

one which will be discussed later in connection with format selection. In much research to date adequate care has not been taken to separate learning from enjoyment or preference. This applies to both students and teachers, who often say they enjoy, or do not enjoy, teaching by TV. Our goal should be primarily learning, rather than enjoyment. And whether a given medium makes teaching easier or more pleasant is less relevant than the learning which occurs, except where teacher attitude and motivation factors become significant obstacles or incentives, outweighing other considerations.

Formats and Techniques

Production approaches inherited from commercial practices aimed at entertaining and enjoyment rather than learning are a serious obstacle to effective TV, radio and film use in eduction. In the first TV procution workshops conducted by the NAEB, most directors were commercially-oriented regarding camera use. They wanted to use several cameras, switch often, dolly in and dolly out, change lenses and so on. We had great difficulty in training them to leave the viewer in uninterrupted contact with the speaker or visual for the longer periods of time which concentrated learning requires. Fortunately the desired new techniques are emerging, based on solid study of which approaches are most effective for our purpose, which is education, rather than variety or enjoyment--although the latter can not be entirely disregarded of course.

Cobin and McIntyre found that students, bent on learning, themselves preferred simple production techniques, such as continuing close-ups, to a variety of shorter, rapidly-changing shots. It sppears that a new type of enjoyment, based on the satisfaction of learning better, can be developed when the individual seeks learning, rather than entertainment. Even at the

eighth grade level, Blain found students learned more from simple expository than from dramatic narration formats. Since learning depends upon activating the individual with proper cues in order to bring about desired attitudes or behavior, irrelevant cues, or an over-abundance of them, may obstruct rather than facilitate learning. For this reason cheap pencil or blackboard sketches, which do not distract from the desired focus of attention, have repeatedly proved to be at least as effective as the most expensive films, graphics or the use of color. In fact, then, the most significant findings indicate the desirability of simplicity and directness, although this generalization must be modified depending upon whether the desired audience is a captive audience in a classroom, or a "free" audience. In the latter case humor or dramatic format may serve the useful purpose of keeping the desired viewer present, or attracting him in the first place. Once he is attracted, the continuation of entertainment cues or the generation of responses irrelevant to learning, such as laughter or anxiety, are likely to distract from learning. Much care needs to be taken, therefore, in interpreting results to be sure they relate to the specific situation <u>you</u> will be working in. In some cases a compromise format, with some so-called showmanship attraction, may be the best solution applicable under the circumstances, even though it would be a less effective for a captive audience.

This does not mean that production must be unimaginative or dull. Camera angles, for example, can be of great importance. Armed Services studies revealed that the recruit learned manual skills, such as assembling guns, better when he could see the demonstration from the angle from which he would see the object in assembling or handling it. Rather than watching a demonstration from the front (180° angle) as he would watch an instructor opposite him, in other words,

tests have proved the value of camera angles which put him "in the driver's seat" where he would sit or stand while doing the operation. These are unique advantages which TV and film offer as opposed to the "mirror-image" view which the student is frequently unable to cope with. Similar findings with regard to lighting principles, and the use of proper non-distracting or re-enforcing backdrops (limbo versus sets) have been explored in interesting studies by Tannenbaum, Fosdick and others. Such research is not in the luxury class. Its findings often may make the difference between significant learning and little or no learning.

One of the problems deserving equal attention is how complete and finished to make a given presentation. An old Austrian professor whom I respect used to tell us that the best teacher is the one who is best at "leaving out." If nothing is left for him to do, the student's active learning effort is partly frustrated. This is the basis of the philosophy of one of the most original thinkers of our generation, Canadian Marshall McLuhan, who uses the term "high definition" to describe what leaves little for the viewer to do--making for good relaxed entertainment--and "low definition," which challenges the viewer or hearer to complete it. Educators would do well to emphasize low definition even though this runs counter to the slick and enjoyable Commercial TV and Hollywood-type approaches we are inclined to identify with pleasure and excellence. After viewing several such slick productions, a student of a friend of mine, John Henderson of Purdue University, protested that the "utter perfection" of the films distracted him from what he was trying to learn. This confirms a finding reported by Lumsdaine that a simple $1500 film resulted in as much learning as a $23,000 color one.

Some studies have even explored the value of "spot annuncements" and "singing commercials" as formats for learning. More research might still be done on these,

though Vander Meer concluded from his studies in 1953 that signing commercials were more expensive and obviously more unusual than traditional formats, but resulted in no more learning than cheaper and simpler approaches.

I am sorry that most valid research has so few simple answers to offer. This is particularly true in answer to the question: what length program or film is most effective? The answer: it all depends... The attention span of a first-grader is shorter than that of a high school student, generally. Better students have usually been found to have longer attention spans than slower students. A subject like art may well profit from a longer program than a subject like French, which requires a series of intense concentrations on difficult problem-points. Children who watch lots of TV, and are conditioned to interrupting commercials, seem, very tentatively, to have shorter attention spans than children who read more, or see more movies than TV. Attention span, like skills, is developed by practice and use. Research your problem. Then decide.

Similar problems exist in deciding whether to use still or moving pictures. For many kinds of concentration and analysis, stills are obviously better. For analysis of function or motion, movies are better. But not always. It all depends!

Similarly, how long should the units or steps be in a presentation? Maccoby, Sheffield and Lumsdaine have tried long and short steps, splicing in thought-provoking questions in some and not in others. All are best in the proper situation. No simple answer is possible. In a general way, however, the findings of Blancheri have considerable relevancy. He found that members of a group which alternately learned and practiced short steps (9 steps about 5 minutes each) did their lab work in less time than those who viewed the whole demonstration before practicing. Hence the desirability of start-stop short sequence film equipment for numberous uses.

In sequencing and paired-associates studies, researchers have tested whether the best sequence is word-picture or picture-word. There is a best way for a given situation. But findings of different scholars contradict each other because what is taught. to whom, and under what circumstances are all variables that can't be controlled when experiments are conducted under such widely varying conditions or in different school systems.

How large a picture or screen is best? Here again: a large picture is fine for some things. But a large picture or wide screen is poor, or virtually worthless, if the learning calls for concentrating on a certain sigificant point, detail or action. The eye can encompass only small points at a time and it may be distracted by the irrelevant part of the picture at the very moment the critical function to be observed happens.

In animation, cartoons, or diagrams, how complete should they be? How many details or visuals are essentail, and at what point does their proliferation bog the viewer down in too much detail? As we go along we are finding that visuals as barren of detail as possible usually best aid in learning. In general a good rule seems to be emerging: never use a Mack Truck or a Rolls Royce for something which a Volkswagen or even a bicycle may do much more easily and clearly.

But I said that there is room for production imagination. There is. Voorthies experimented with the simultaneous use of three TV cameras, each viewable on a separate receiver. He found that the learning involved in his experiment, in Theoretical and Applied Mechanics, split screen uses of TV enable students to see meters and equipment which is far away in another building, side by side on the screen, simultaneously. In this way TV can bring together for comparison objects far apart in space. Pop-in arrows, pointing devices and high-light beams all offer new opportunities which imaginative producers are invited to explore.

Neither film nor television needs to be "just a picture."

Multi-Sensory versus Single-Channel Uses

In their Editor's Introduction to the Year Book of Education 1960 (p.12) Bereday and Lauwerys Write: "It is often assumed, that communication through more than one sense organ is in some sense better than communication through only one. For example, that television is better than soud-radio, sound-film than silent film, and that Aldous Huxley's Smellies and Feelies would be still better. Similarly, it is often believed that, of necessity, moving film is superior to stills; a solid globe to a flat map; a living animal to a stuffed one, and the latter to a drawing." The entire volume they edit, fortunately, challenges this view. But let's explore this problem a little further, for I'm sure many of you may be convinced that more is better.

Have you ever tried to concentrate on seeing something under a microscope? Do sound or music help? A little guidence does perhaps. But have you ever caught yourself "waving down" speakers or other distractions so you could see better? Or closed your eyes so you could hear something better? Of course stereo is better than mono--for enjoyment. But when you're trying to follow a score for one of the voices or instruments? Hasn't much that you've learned, rather than enjoyed, been via single sense-by-sense probing from which other senses only distract? The senses are not like single separate boxes in the nervous system. They are snychronized and inter-connected in a central switchboard. The impact of one can destroy that of the other as well as re-enforce it, if it is out of phase, or irrelevant, or simultaneously distracting.

Hartman cites over a hundred studies on single versus multiple channel communication. More aren't always better. In fact, rarely. TV's and film's greatest strengths may be always at their best in simultaneous combination uses. There are useful solo functions that can be performed which are sometimes better than full

orchestra. In case after case, Hartman and others have found, the addition of pictorial content has reduced learning through the ears, or even from captions, and vice versa. The most interference seems to occur in three channel presentations: audio, print, pictorial. These interfere with each other more often than they reenforce each other, simultaneously used. Our senses can't cover that many bases at once. Experiment after experiment has revealed that at best adding a third, and sometimes a second, channel usually did not advance learning and at worst it seriously interfered with learning. Hoban and Van Ormers' survey in 1950 found visual plus aural is usually better than the poorer of these two media, and sometimes better than either, but often the two are not as effective as the best alone.

Films which are not entirely congruent in their visual and sound, when there is a deviation, tend to teach what is said, rather than what is shown. Why, then, use two channels unless necessary? Surely education cannot afford a wastage comparable to that of commercial TV, for example, in which TV, under the lash of competition, does everything, including what it does badly and more inefficiently than other media could do?:

In some cases where TV or films, or both, have proved superior, is it because TV, for example, did all things simultaneously, or is it rather because most of the time it made skillful one-at-a-time use of sound, print, pictures and motion, so students could "field" the impressions adequately? This is the rational way. Advertising and commercial entertainment, of course, seek to overwhelm by multi-sensory assualts which by-pass rationality. (Hayakawa). In this way you find yourself buying things you don't in the least need, and never really wanted, and doing other irrational things.

Here again, however, many of the experiments I report have been in captive viewer situations. Sometimes it may be important to hold or attract with a picture so you can tell the student something. In a general way, however, words (spoken or printed) seem better for conveying knowledge about things, and generalizing, whereas pictures give better knowledge of things (real acquaintence, experience)

and seem better at particularizing. This is the value of audio plus visual media. This is why we must learn more about the proper orchestration of all these media, allowing for solos where solos are needed. After all a symphony plays full volume only a relatively small portion of the time. TV and film; please copy.

In brief, cues from different modalities, used simultaneously, may either facilitate (re-enforce) or interfere with (block) each other. Our need is for more research to determine the proper mix, for all too often they are getting in each other's way.

Motivation

One of the most common learning theories is the one (Miller) which says that learning requires and involves motivation (drive); stimulus (cue), participation (response) and reward (re-enforcement). The student is more likely to learn if he is curious, needs the information offered to solve a problem, wants to win recognition or approval, and so on. A teacher who appears bored or negative, or parents or a community which give low values to learning, can greatly reduce the motivation of students. The problem often is to stimulate the proper learning but not undersired, irrelevant or improper learning (violence, delinquency etc.). Good motivation, in a good educational environment, will cause a student to want to learn what is taught. Motivations vary greatly for different socio-ecomomic groups, different schools, different classes, and different individuals. This is why it is so dangerous to generalize too widely from the results of projects in the same subject or format: the motivational situation may be wholly non-comparable. I shall have more to say about the motivations supplied by the commercial mass media, as a national community problem, later. At present, let's look at a few sample motivations relevant in the classroom.

In teaching sewing by TV, it has been repeatedly discovered that proper girls--often negro children--learn more than children in higher socio-economic classes. This cuts across geographical areas and age groups. It would be easy to draw several wrong conclusions from these findings: to conjecture, for example, that such

students are more manual or trade-skills oriented. A more valide one, however, would seem to be that these students need this skill more than more advantaged students, because of the economic necessity to make their own clothes. Need is a powerful motivation. A depression might result in greater nation-wide learning of such skills, not because they would then be taught, but because they would then be more greatly needed.

Strevell and Toffel, in projects involving negro students, found that the negro students frequently made significantly more gain than white students of the same IQ or rated ability in instructional television classes. Although many white schools would not participate in the Toffel experiment, he found negro students in ITV classes made higher scores than those not using ITV. But students of highest ability, regardless of race, did best in the face-to-face classes, though lower-ability students, regardless of race, did better in ITV classes. But questions arise which must be answered before we can generalize: What kind of teachers were available to each, both for motivation and follow through? More experiments with under-privileged groups (Puerto Ricans, Negroes, etc.) are needed. However, there is here a hint that ITV may be a most useful tool to help equalize opportunities in poor areas, and to help soften some of the difficult problems of desegregation. The national motivation climate would seem to encourage such uses.

Anxiety or tension is frequently used motiviation. A certain amount of anxiety does seem to provide beneficial drives. But several Australian studies and those of Ruesch and Prestwood raise some cautions. Too much anxiety and tension repeatedly resulted in making the listener-viewer upset and tense, frequently to the point of causing quarreling or violence. In safety education too, a lower degree of anxiety arousal proved better than too high a degree, based often on excessively gruesome pictures of accidents and wrecks.

There is a danger that the target individual may be scared into rather than out of trouble, if anxiety is overdone.

In the years ahead, when competition among students is likely to be high as they compete for college entrance, some of the consequences of over-znxiety are likely to show up in disciplinary problems. New media planner may need to counter-balance anxiety with more re-assurance if serious problems are to be avoided.

Participation and Feedback

One of the strongest motivations available for learning is a sense of success. With the new media, in combination with teaching machines, we have the tools to provide knowledge of results more quickly than ever before. It is fortunate that such instruments became available at about the same time as ITV, which, by itself, is so notoriously a one-way medium. Many of Skinner's principles regarding the advantage of testing, problem by problem, as quickly as possible, have equal applicability to film, radio and TV uses. Many studies available reveal considerable advantages of combining practice, or drill, during the showing of visual aids, rather than delaying to the end of a longer presentation.

But some problems exist. Note-taking, as a form of participation, or the filling in of blanks, has frequently resulted in less learning than occured in classes taking no notes. But this can not be generalized. In somes cases this only means that the pace was too fast for the student to both view and solve problems at the same time. For such situations, radio or audio recordings alone offer advantages over visual media which distract from what is heard. If the latter are used, the pace must be much slower and pauses must be built in. For the learning of Russian reading (not speaking) ho3ever, Grosslight and McIntyre found that groups in which the words were pronounced aloud inhibited learning as compared to visual-only presentation. Here again, which is the distracting channel depends on what the lesson seeks to accomplish.

Ever since educational or instructional television has begun to be used, users have tried to devise feedback channels whereby students can ask or signal the TV teacher to explain unclear points in the presentation. Pushbuttons have also been used to register highest positive interest, in order to guide planning of subsequent presentations. Unfortunately, as Twyford found, though these register interest, they do not adequately register achievement or learning, which is the primary goal. Woodward found that a group with pushbuttons did better than a control group viewing a program in which no push-button feedback was used. But a group viewing the push-button feedback presentation, but without access itself to a push-button signal system, did as well as the group equipped with the buttons. Apparently, from several studies, the need to push the button itself is a slight distraction. The numerous program-analyzer systems which have been devised, since they measure principally interest rather than learning, are less effective than teaching machines with drill push buttons used during breaks or after the presentation. TV needs the help of other devices if this feedback-participation function is to be realized.

Since "no significant difference" has so often been the conclusion of studies with feedback systems, whether involving microphones, telephones or other devices, Hagerstown has abandoned efforts to achieve such immediate feedback for ITV, relying on the evaluations that come in a few days later. On the basis of these, a good instructor can usually build into the revision, for next time, clarifications of points not clarfications of points not cler in the earlier presentation. "Trial-run" presentations, on this basis, may be desirable. As for immediate question-asking, the Hagerstown report has concluded: "The disruptive question is not asked because all questions must wait." Some questions, deliberately left for the classroom teacher and discussion to convey, may so far be the most desirable solution to this problem where teaching-machine complements to TV are not used, or in specific situations where they are not found desirable.

Certainly TV lessons are not generally adequately utilized unless some such follow-through occurs.

For the sort of re-enforcement of learning which feedback and participation attempt to provide, repetition is often effective. Driscoll, in a study with mentally retarded children found that the scores of students who saw the same film twice were significantly higher than those of students who saw the film only once. Frequency of exposeure, within limits, increases the likelihood of message units being effective. I said "within limits" because of the danger of extinction of effects boredom and other negative adaptations. Repetition is likely to be least effective generally for experienced or mature adults, and most effective for children, particularly slow learners. Repetition in mixed groups, however, may adversely affect fast learners. There is no easy law of repetition effectiveness. As in so many cases, it all depends...

For all these considerations race and sex, or sometimes even class-level, are less important than differences in socio-economic status. The results of studies at School X will be applicable or useful to School Y only if carefully analyzed and considered. This requires people qualified to interpret and apply findings.

Color

There is no question but that color is essential for certain things. In surgical demonstration, for example, where veins must be distinguished from arteries and tissues identified, absence of color would be a serious handicap. However, this type of distinction is needed in relatively few general educational courses. In the vast majority of cases, as Kanner has said, there is "no evidence that color offers may advantage for learning." Vander Meer and his colleagues found that students preferred color, but that there was little correlation between preferring and learning. May and Lumsdaine concluded that "color is some places in a film may facilitate learning--in other places it may inhibit learning."

On the basis of solid research, although color is pleasanter and more inviting (which may be a factor as a motivation), the value of color for learning has been greatly over-rated.

In his studies in South Africa, Hudson concluded: "The Hypothesis that color film improves performance is rejected." Fullerton et al found the scores of guidance students in black and white groups "significantly higher" than students in the color group on both the immediate and delayed post-tests, as noted by MacLennan and Reid, although Vander Meer found in some instances that color reduced the rate of forgetting.

In psychological studies of the effect of color, it has been found to be and important factor for securing and holding interest. However, it has occasionally proved too effective in this respect, riveting attention to the exclusion of learning, and sometimes resulting in more intoxication and hypnotic effects than discriminatory ones, which are important to education.

If funds are available, Kretsinger has suggested, it may be more essential to devote them to securing higher-definition black-and-white quality, which is an important factor. In many projects color has reduced desired definition and contract to a significant degree, and has provided distracting elements when judged by purely learning and discrimination criteria.

At the present stage of development, therefore, the conclusion seems to be that the advantages of color for general use are not yet demonstrated, and that it therefore cannot be justified economically except for limited, specific uses where it will be better rather than poorer than black and white.

Several Problems Which Need Attention

Although the problems listed here (selected from a host which might be mentioned) have little in common, I would like to share them with you.

1. Misuse or misinterpretation of results. Like program ratings in commercial broadcasting, which have many flaws, the research cited here, in general leaves much to be desired. But one of the greatest dangers lies in its over-generalization or mis-application. How are results to be compared when even the notes of the projector used is a factor? McCrane found in one study that at the lowest projector noise level, the film group was superior to the TV group. With only medium noise there was no significant differences. With a noisy projector, the TV group rated superior. Many may plan changes in schools, to TV or film or radio, when it was not the medium but the teacher, or some other factor, that made the difference.

What are "conventional" methods? In some schools teachers conventionally use visual aids. Some use one text, some another, and some none. Some teachers use them badly and some well. In all too many cases researchers are not qualified. Variables are not controlled, or even noted. Morale, acoustics, distractions, socio-economic differences, lighting, ventilation, climate, season, time of day, freshness or fatigue of class, screen size and distance, angle from screen or TV set, clarity of instruction, motivation--all are factors which make generalizations hazardous.

Hayman found that students in the center of a room, viewing TV, made significantly higher scores than students along the sides. Ash and Jaspen found learning as good as or better than face-to-face teaching for students within a certain angle and distances from the set, while students outside this perimeter learned little. One of our problems, therefore, is to get better studies, and not to draw

unjustified conclusions from studies with to many concealed differences.

2. Inadequate Testing. Most results have been measured by test designed for print learning. How are the learning effects of TV be forced into such a pattern?

Many tests are based on what students (or teachers) <u>think</u> of a program or leasson. The fallacy of believing what children <u>say</u> is illustrated by studies in Sweden, as reported by Australian scholar Gordon Mirams: "Contrary to common belief many cartoons and Tarzanlike films frighten very young children; some cried and tried to leave the cinema, others had nausea, and parents later reported cases of bedwetting and nightmares. Yet the same children said they thought the films funny and at first refused to admit they were scared." Experiments by Mary Field and other film scholars have found infra-red photographs of children, while viewing, often more reliable indicators than subjective measures. Our testing apporaches need to be greatly improved, for obviously many intangibles are not now being reported.

3. The anti-educational effects of much commercial fare. These effects are of several kinds. Teachers and producers imitate the techniques of commercial entertainment uses. We have lost several years trying to break these habits. Good entertainment techniques--and not all we see are good even by those standards--are not the best for education. The prettiest teacher may produce more enjoyment--and distraction---than learning.

More importantly, the popular image of the teacher in the commercial media is usually a caricature. The pedant, the old maid make good jokes. They create little respect for teaching. Respected and admired stars daily engage in behavior which countermands the goals of education (hayakawa).

In many content studies, documentation has been provided of ways in which commercial broadcasting contradicts and subverts the lessons of education. Spending is taught rather than saying; waste rather than conservation; show people rather than scientists, educators or artists are shown as heroes to be imitated; emotional rathers than rational bases of decisions are urged; violence and do-it-yourself justice is shown as faster and frequently preferable to due process, and so on.

The analogy may be unfair: but is the environment for education not as seriously affected by such elements as the environment of a school building is by its surroundings? How tolerable are taverns, shooting, or fields of weeds surrounding educational facilities? One of the problems, then, can not be solved in the schools, but only in the community--in pressing for sounder electronic environment and less harmful electronic fallout. The Hagerstown report says two important things about these problems. First: "The ideas that foster conformity do not come from television. They come from those who use it." And secondly, Hagerstown found children, conditioned by commercial uses, "just sitting, watching something happen." The report adds: "It required time to accomplish this change in viewing habits." Parents and organized groups can help the schools enormously with this problem.

4. The Need for Training in TV and Pictorial Perception and Discrimination. Practice in learning from given media results in the development of the ability to learn from them. It took Hagerstown a year. But their level is still not high engugh.

Learning to learn from TV and films is as specific and trainable a skill as learning to read. The untrained foreigner a sports events sees little. The student first looking through a microscope is baffled until he learns to put the strange shapes into perspective. Africans watching films on insect control, with magnification to fill the whole screen, remarked: "We'd be frightened of mosquitoes, too, if we had them that big." We see what we are trained to see. Teachers and producers can not trigger students with cues to learning if the students are not trained to recognize these cues. We need courses in TV and film "reading" at least as badly as we need courses in reading print. Eye-movement projects are relevant to the development of such skills. In this fast-changing world the greatest contribution that can be made is training children to learn. Many will need to be re-trained when their jobs are automated out of existance. Teaching modes of attack, avoidance of error, analysis, discrimination and principles of transfer, as outlined by Postman, are essential if tomorrow's citizens are to remain educated, once they leave school. This training will help create a generation of more critical and informed viewers for commercial as well as educational media.

Conclusions and Recommendations

By now you must have discovered that what I have been taling about, all along, is the need for knowledge of learning theory and its analytical application, if these new media are to be properly used.

At a meeting late last year of the Council of Chief State School Officers, Dr. Francis A. J. Ianni of the U. S. Office of Education noted the directions from which the principal pressures on the schools are coming. Among them he emphasized:

1) The explosion of knowledge, which treatens to make much of <u>what</u> schools now teach obsolete (not merely <u>how</u> they teach).

2) Recent advances in learning theory which stress the urgent importance of <u>early childhood</u> experiences, individual differences, and the realization that we have hardly scratched the surface of man's ability to learn.

3) Technological change, which creates new occupations and makes old ones obsolete overnight, thereby demanding new skills, new professions and new means of training.

How well are we using our new media to meet these new pressures? How <u>new</u> are such programs as "new math"? A year ago the International Conference on Modern School Mathematics was held in Athens, Greece, sponsored by the Organization for Economic Cooperation and Development (OECD). The report of the proceedings of this confernece is now available from McGraw-Hill, as edited by Dr. Howard F. Fehr, Chairman of the Department of Mathematical Education of Teachers College, Columbia University.

The conference of 47 experts from around the world looked at mathematics education around the world. In its analysis of the "new math" in the U. S. it found that we have merely updated the traditional program, keeping the same old sequence: arithmetic, geometry, more algebra, trigonometry and so on. There must be a recognition that the simple updating of a traditional program and sequence, merely injecting modern concepts and treatments into the same curriculum, is hardly a "new math". What is needed is a <u>new</u> program, based on a total reconstruction of the curriculum. Our new arsenal of miracle instruments now makes such breaks with the past possible. Where do we find <u>such</u> projects, involving the total administration of schools? Do most of the projects not look more like projects "dreamed up" by amateur researchers in order to get a grant, and emphasizing merely methodology, new gadgets and gimmicks, how to save teachers and space, and so on?

And what is the quality of even this research? After his careful and scholarly survey in depth of new media research, Lumsdaine (in Gage) refers to "...the morass of ambiguity and inconsistency which has led some, including the writer, to wonder whether it is worth doing experiments until some basis for achieving comparable sensitivity from experiment to experiment is achieved... In the absence of suitable, uniformly applicable criteria of experimental sensitivity, it is nearly impossible to know just how bad it (the situation of educational media research) is." I know these are strong words. But after my own review of thousands of studies, I must generally endorse them. It <u>is</u> a disheartening picture. There are too few significant studies. The lack of a tradition of solid learning research in the schools for the last hundred years has left us unprepared. There should be hundreds of professional researchers, with proper training and disciplines. There are hardly any qualified to do both communications and educational research.

The effectiveness with which the potential of each of the media we now have available is realized depends on the identification of desired of desired objectives and the application to these objectives of their unique powers, each at the proper time, in the proper manner, in proper combination or alone. We now have a whole orchestra of instruments. We need trained arrangers and conductors who don't use drums where violins are needed. The best device is the one that, for the task at hand, best does the needed and the relevant, without introducing irrelevant factors which cancel or distract. This is no easy job. It requires the kind of specialist we must now begin to develop: the instructional media communications specialist. If we don't meet this need, the tools, and what they can most easily or flashily do, will determine what is done in the schools of America. This is wrong. Goals must be set first, and they must be set by the <u>total</u> educational need, structure, and administration. This is not a job for audio-visual experimenters. Those in the ivory tower must come down and help, until we know we're even doing the proper things for our age. Then the whole battery of specialists can take over again. Unless this is done, these instruments will be the masters rather than the servants of education and educational policy. Once goals are set, significant research can be done. It will have direction.

Hypotheses then can be developed, with valid systems of testing them. Experiments will include matched groups, so control and experimental groups are really comparable--rather than testing one class, with unknown characteristics, against another. Class-to-class and school-to-school differences are now so great as to invalidate much of the research at hand. Re-tests must be used before results are published. A single experiment rarely proves anything. Materials, teachers and other environmental factors must be objectively recorded, so comparability means something. Studies will need to restrict themselves to measurement of factors that can be controlled and really measured so differences will be genuinely

significant and generalizable. Then great care must be taken in the application of findings, if we are to avoid the shortcomings found in the commercal media application of ratings. Lumsdaine has spelled out the qualities needed for research to be valid. But first and most important, there must be the development and training of a generation of research workers, and more communication among them. WE NEED A TRULY NATIONAL EDUCATIONAL RESEARCH CENTER AND PROGRAM AT LEAST AS BADLY AS WE NEED A NATIONAL CULTURAL CENTER.

This call for a new profession is not a new one. Lasswell outlined this need at an NAEB convention nearly twenty years ago. He has refined his suggestions in an article in Audio-Visual Communication Review in 1958, which I have listed.

This development has been held back somewhat by jealousies and schisms among audio-visual personnel, educational broadcasters, teachers, administrators, educationists, and other groups. The climate is now right for this development, except for the presence and interest of upper-echelon educators in greater numbers at the policy level. The approach needed will promote no one instrument or interest. It will involve learning and communication theory, cutting across media and disciplines equally, though stressing the visual and aural arts and media, integrated with teaching machines, programmed learning, and new uses of the older print and verbal fields. Our sights must be lifted from research into any one instrument, into more concern for the totality of learning behavior and the learning process, as Schramm has put it. The "systems" approach to education is now needed. And we must not be awed by this term. It is not a complicated concept. Digestive systems or telephone systems are simply an organized integration of parts functioning together. We have the parts. We have the parts. We must now put them together properly, and use them under proper supervision and coordination.

I do have two or three additonal suggestions, before closing, which may be somewhat controversial. First, as I earlier remarked, I believe too much of our research has been of too little social significance.

It is pretty hard to get the community and the nation excited about head-of-a-pin type studies of purely methodological interest to only very specialized groups. I believe it would bring the schools back into a more respected relationship with the rest of the nation, and our problems, if more studies were related to more important national problem areas.

Let met illustrate. The Area Redevelopment Act of 1961 is aimed at reducing unemployment. This Act provides for research and study grants for projects to help produce solutions to such problems.

The Manpower Development and Training Act of 1962 is aimed at developing programs for creating opportunitirs for re-employment with new skills of people whose jobs are automated out of existence. I once got into a controversy over our policy of economic foreign aid, when I challenged the desirability of introducing into nations with large employed populations, like India, of labor-saving devices. I urged that labor-using apporaches, stressing individual crafts and arts michg be usefully tried. This runs counter to our industrialized orientation, I know, but I believe education might take the lead in stressing approaches based on individual differences and talents. Many experiments could involve such areas rather than merely the traditional language, math, science, home economics and other such fields.

The Vocational Educational Act of 1963 earmarked ten percent of its 1964 appropriation of $180 million for research, demonstration, and pilot studies. How many new media research projects have helped with this problem?

The Urban Mass Transportation Act of 1964 calls for research, development and demonstration projects in all phases of urban mass transportation. Opportunities for new media uses in the promotion of auto safety and a score of other problems are obvious. To what extent are schools helping?

The Housing Act of 1964 calls for "programs which will provide special training in skills needed for economic and efficient community development for those technical and professional people who are, or are training to be, employed by a

governmental or public body responsible for community development." Can the new media not help here?

The Mental Retardation Act of 1963 aims to assist schools to attack the problem of mental illness "through various approaches." Are the new media not among the possible approaches to this problem, with the need for training (or re-training) teachers, speech correctionists, sight and hearing specialists, and so on?

And the Economic Opportunity Act of 1964 (the Anti-Poverty Act) would seem to be relevant. Is poverty not deeply related to education and motivation of the kind that the new media could help with?

I list these few such programs not merely as possible sources of funds. Research so far has already been too limited by what foundations or the government would give funds for. I name them rather for the purpose of identifying some areas in which new media research could be applied without too seriously affecting their findings, but which would make these studies more socially relevant. Would the community not eventually find such research well worth supporting?

One other wasteland I must mention. I am not the first individual, looking over results of significant communications research in our great nation, to be amazed at the virtual absence of support of such research by RCA, CBS, ABC, G E, A T & T, Eastman, Time-Life and others who earn millions each year from communications and education. The automobile industry has supported driver-training programs. Publishers and newspapers have supported training programs in the print-media. Even the tobacco industry is now devoting millions to research. If the broadcast industry and networks would devote a small fraction of what they devote to public relations and market research to psychological and educational research--the effects of color, graphics, new devices for the schools and so on--the schools would be stronger and our nation's future brighter. I think such support is overdue.

Meanwhile, don't quit. And don't wait. I mentioned at the beginning that I personally believe that some of the most significant experimentation to going on without grants, and mentioned a Purdue project. There are probably scores of others. But let me explain this one.

Dr. Sam Postlewait, Professor of Biological Science, with a minimum of expense and maximum of imagination, has designed a systems approach which involves virtually all the media I have sought to report on. It involves student access to thirty booths in which audio tapes of the lectures are available for playing, replaying, backing up, and stopping, with visuals. films and other resources at hand, including microscopes, slides and sonora. In an adjoining room are display tables with those items, including live models, colorometers, etc., of which only one each is available. Fifty percent less material is needed than was previously used, less equipment and lab space is needed, the same number of teachers are employed, the number of A's given has risen from an average of 7 to 20, the number of failures has fallen from 20 to 12, and the whole course is now restructured. The goals of the course dictate the methods. The tools do not dictate what is taught, for all tools are available. The teacher is a guide-tutor. The tutorial system is re-instituted by used of the new media. The department saved $1400 the first year by this vastly improved approach. Eastern Michigan and Penn State, with similar approaches, are having similar results. Small colleges in the South have asked for the materials, and Sam Postlewait's supervision. They will soon be giving as good a course in introductory biology as Purdue.

Admittedly this has not restructured the entire science program. That can not be done by one department or man. But this step has provided clues for future restructuring. Meanwhile, using imagination instead of grants, science education is vastly better at Purdue and will soon be far better in many other places

Such research and development must now be accepted by the schools as essential. They are part of a continuing process of experimentation and innovation which the new madia make possible. But they can not succeed if only audio-visual or radio-TV people are involved. They must include the entire school: administration and teachers, as well as researchers. The excitement and usefulness of such studies can also vastly help arouse community interest and support. Many of them can be televised and demonstrated for all to see.

I'm sorry I couldn't make the picture I have presented both simpler and easier. But these are tough times. The challenge offered by the new tools is the greatest one education has faced since the invention of printing. We must learn to live with change,as never before.. And this is not easy. I'm sure I'm too close to these rapid developments to enable me to present an overview that is adequate and balanced. In a few years a better analysis will be possible. But for now, that's the picture.

And my apologies for the length of this paper. As a famous Frenchman once said: "I didn't have time to make it shorter."

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